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Indian Standard

METHOD FOR EVALUATING THE RELATIVE EFFICIENCY OF WETTING AGENTS FOR MERCERIZATION

(Second Reprint JANUARY 1982)

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

August 1969

AMENDMENT NO. 1 MAY 1983

TO

IS:5151-1969 METHOD FOR EVALUATING THE RELATIVE EFFICIENCY OF WETTING AGENTS FOR MERCERIZATION

(This amendment has been carried out for giving the details of preparation of wetting agent and caustic soda solution)

Alteration

(*Page 5, clause 4.3.1, Note 2*) - Substitute the following for the existing note:

'NOTE 2 - It is often better to mix the wetting agent thoroughly with small volume of the caustic soda solution before adding this to the bulk of the mercerising solution. It should be particularly noticed whether the wetting agent remains well dispersed or dissolved, because separation of an immiscible layer on the surface would entirely viciate the results and give false values.'

(TDC 5)

Reprography Unit, ISI, New Delhi, India

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METHOD FOR EVALUATING THE RELATIVE EFFICIENCY OF WETTING AGENTS FOR MERCERIZATION

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Indian Standard

METHOD FOR EVALUATING THE RELATIVE EFFICIENCY OF WETTING AGENTS FOR MERCERIZATION

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 30 June 1969, after the draft finalized by the Chemical Methods of Test Sectional Committee had been approved by the Textile Division Council.

0.2 To facilitate uniform, thorough and speedy impregnation of textile materials which is much desired in mercerizing, wetting agents are extensively used. From among the varieties of commercial wetting agents, the textile processor has to choose the one suitable for his requirements. Formulation of standard method of test for determining the relative efficiency of wetting agents used for mercerization is, therefore, necessary.

1. SCOPE

1.1 This standard prescribes two methods for evaluating the relative efficiency of wetting agents used in the mercerization of cotton textiles.

2. PRINCIPLE

2.1 In the first method the time required for complete wetting of a bundle of yarn or canvas disc in caustic soda solution containing the wetting agent is determined. For the same concentration of different wetting agents, lesser the wetting time, higher is the efficiency of wetting agent. In the second method, a single cotton thread is allowed to contract in caustic soda solution containing the wetting agent for definite time and the contraction is determined. Higher the contraction, more efficient is the corresponding wetting agent.

3. REAGENTS

3.1 Quality of Reagents — Unless specified otherwise pure chemicals shall be employed in tests and distilled water shall be used where the use of water as reagent is intended.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the test results.

3.2 Caustic Soda Solution — 300 g/l.

NOTE — The solution should be allowed to stand and supernatant clear solution be used.

4. FIRST METHOD

4.1 Apparatus and Materials

4.1.1 *Beakers or Glass Jars* — of 600 ml capacity.

4.1.2 *Measuring Pipettes* — graduated in 0·05 ml.

4.1.3 *Measuring Flask* — of 500 ml capacity.

4.1.4 *Stop-Watch* — to read correct to one-tenth of a second.

4.1.5 *A Special Holding Device* — made of stiff stainless steel wire with a coil about 50 mm in diameter at one end and a hook in the centre of the coil to hold the test specimen (*see* Fig. 1).

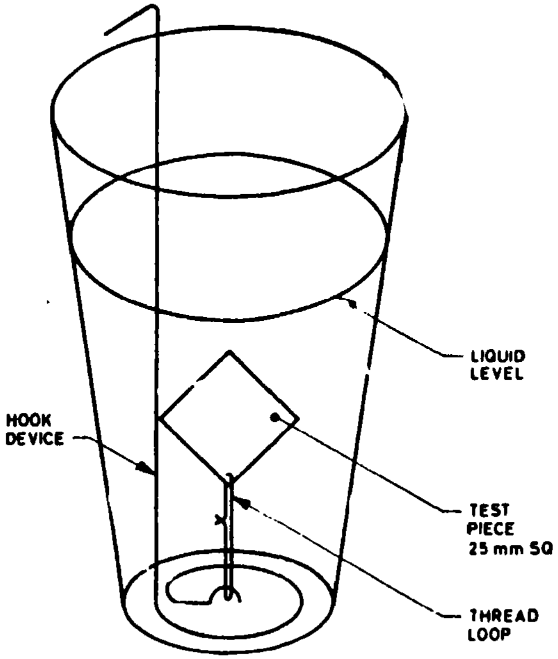

FIG. 1 APPARATUS FOR DETERMINATION OF WETTING TIME

4.1.6 *Cotton Yarn or Cotton Canvas*

Cotton yarn — grey, unboiled, 15 tex × 2 (or $40^s/2$) combed, long staple.

Cotton canvas — grey, unboiled, 615 g per m^2.

4.2 Preparation of Test Specimens

4.2.1 From the grey cotton yarn, cut out the required number of bundles, each containing 160 parallel ends, 25 mm in length. In case of canvas, cut out the required number of test specimens of size 25 × 25 mm with the help of a die. Alternatively, prepare test specimens of 25 mm diameter.

NOTE 1 — The cotton yarns may be tied by single thread of the same quality (*see* **4.1.6**) to form the bundle.

NOTE 2 — The square pieces may be cut with sharp pair of scissors. Precautions should be taken that there are no frayed ends.

4.3 Procedure

4.3.1 Take a 600-ml beaker or glass jar. Pour 500 ml of caustic soda solution at 27 ± 2°C. Pipette out 3·75 ml of one of the wetting agents (*see* Note 1) under test. Stir the contents until the wetting agent is dissolved completely in caustic soda solution (*see* Note 2). Allow the solution to stand until all air bubbles have risen to the surface.

NOTE 1 — It is presumed that the mercerizing wetting agents are mostly liquids.

NOTE 2 — It should be particularly noticed whether the wetting agent remains well dispersed or dissolved, because separation of an immiscible layer on the surface would entirely vitiate the results and give false values.

4.4 In case of yarn Drop one bundle carefully on the surface of caustic soda solution. Start the stop-watch and note the time required for complete wetting of all the ends.

And in case of canvas attach a loop of thick sewing thread about 100 mm in perimeter to one corner of the test specimen. Attach the specimen through the loop to the wire holder. Hold the wire holder with one hand and the test specimen with the other. Immerse the test specimen in caustic soda solution gently such that the specimen remains upright in the solution and the thread of the loop is also straight (*see* Fig. 1). Start the stop-watch. Note the time required for the specimen to sink as indicated by limping of the thread.

4.5 Repeat the test (*see* **4.4**) for four times for the same concentration of the wetting agent and calculate the average sinking tim

4.6 Repeat the test (*see* **4.4** and **4.5**) with different concentrations of wetting agents, say, by adding 5·00 ml and 6·25 ml each time instead of 3·75 ml of wetting agent in caustic soda solution, and calculate the average sinking time for each concentration separately.

NOTE — If the mercerizing agent to be tested is too efficient or too inefficient to obtain a comparison within the range of the volumes already employed then either smaller (1·25 ml, 2·50 ml) or larger (10·00 ml, 12·50 ml) volumes of the product should be tested

4.7 Plot a graph showing the average sinking time against the corresponding concentrations of wetting agents in ml per 500 ml of caustic soda solution. Similarly, plot the graphs for the other wetting agents under test on the same graph paper.

4.8 From the graphs obtained as in **4.7**, determine the wetting time for each wetting agent under test for specific concentration, say, 5·00 ml of wetting agent.

4.9 Compare the results to determine the relative wetting power of the wetting agents under test bearing in mind that lesser the wetting time, the higher is the efficiency of the wetting agent.

5. SECOND METHOD

5.1 Apparatus and Materials

5.1.1 A 50-ml graduated burette in 0·1 ml with a two way stopcock and a side arm — the side arm being connected to a reservoir.

5.1.2 *A Stop-Watch* — to read correct to one-tenth of a second.

5.1.3 *Cotton Yarn* — grey, unboiled 15 tex × 2 (or $40^s/2$) combed, long staple cotton.

5.2 Procedure

5.2.1 To one end of the cotton yarn tie a one-gram weight. Adjust the yarn in such a way that the knot tied on the weight coincides with the 50-ml mark of the burette. The other end of the yarn is fitted above the burette in such a way that the yarn is in the central position (*see* Fig. 2). Prepare separately solutions containing four different concentrations of the wetting agent under test. Draw into the burette 50 ml of the solution from the reservoir and start the stop-watch when the level of the solution reaches the zero mark. Observe the contraction in one minute (*see* Notes under **4.3.1**).

5.2.2 Repeat the test for nine times for the same concentration of wetting agent in the solution. Calculate the average of the ten determinations.

5.2.3 Calculate percentage contraction as follows:

$$\frac{\text{Difference in burette reading}}{50} \times 100$$

5.3 Similarly, determine the percentage contraction for other concentrations of the wetting agent.

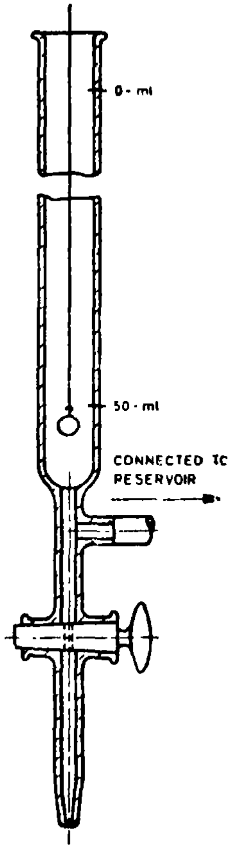

Fig. 2 Apparatus for Determination of Yarn Contraction

5.4 Similarly, determine the percentage contractions for the other wetting agents at the same four concentrations (*see* Note under **4.6**).

5.5 Plot a graph showing the average percentage contraction against concentration of wetting agent. Similarly, plot the graphs for the other wetting agents under test on the same graph paper.

5.6 From the graphs obtained in **5.5**, determine the percentage contraction for each wetting agent under test for specific concentration.

5.7 Compare the results to determine the relative wetting power of the wetting agents under test bearing in mind that higher the percentage contraction, higher is the efficiency of the wetting agent.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Definition*
Force	newton	N	$1\ N = 1 kg\ m/s^2$
Energy	joule	J	$1\ J = 1\ N.m$
Power	watt	W	$1\ W = 1\ J/s$
Flux	weber	Wb	$1\ Wb = 1\ V.s$
Flux density	tesla	T	$1\ T = 1\ Wb/m^2$
Frequency	hertz	Hz	$1\ Hz = 1 c/s\ (s^{-1})$
Electric conductance	siemens	S	$1\ S = 1\ A/V$
Electromotive force	volt	V	$1\ V = 1\ W/A$
Pressure, stress	Pascal	Pa	$1\ Pa = 1\ N/m^2$

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